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MINERALOGY FOR STUDENTS OF DENTISTRY

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INTRODUCTION

For many years some knowledge of crystallography and mineralogy has been considered of basic value in the training of geologists, mining and civil engineers, foresters, chemists, pharmacists, and ceramists for their pursuits, of necessity, take them into the field, or involve the use of minerals as raw materials. Many of them also find the use of crystal-optical methods of great value in their analytical and general determinative work. Furthermore, physicists have recently begun to take a lively interest in these subjects, because of the startling results achieved by the application of X-rays to the study of crystal structure.

Although the beginning courses in mineralogy in our larger universities are generally attended by students of greatly diversified interests, the announcement last year that at the University of Michigan all first year students in the College of Dental Surgery would be required to take a course in this subject was entirely unexpected and surprising to dental educators and teachers of mineralogy. It has, therefore, been thought highly desirable that a brief description of this instruction, including the objects to be attained, should be given.

OBJECT OF THE COURSE

The instruction in dentistry at this university covers a period of five years, divided into one year of pre-dental studies in the College of Literature, Science, and the Arts, or any recognized institution of collegiate standing, and four years of instruction in the College of Dental Surgery. The pre-dental studies include (a) as required subjects, English, zoology, botany, and general and qualitative chemistry, and (b) as electives, foreign languages, mathematics, history, geology, and technical drawing. The fall semester of the first year in the Dental College is also devoted to fundamental subjects, preparatory to dentistry, and includes physics, organic chemistry, drawing, and mineralogy. The technical instruction begins in the second semester when histology, embryology, and anatomy are begun.

Since the successful dentist must, among other things, be an expert observer, have good power of visualization, and possess manipulative skill to a marked degree, it is obvious that these qualities should be developed as early as possible in his course. It is also of great advantage to the student to learn early, preferably before he has begun the highly technical instruction, that he has at least average ability along the three lines indicated.

This special course in mineralogy attempts first, to develop ability of keen observation and of accurate visualization, and second, to determine whether or not the student possesses mechanical or manipulative ability or sense, and third, to impart a comparatively large amount of valuable general and technical information.

(1) Observation and visualization. The recognition of crystal forms occurring on wooden models and natural crystals has long been considered an unexcelled training in keen observation and accurate visualization. This is also true of practice in the determination of unlabeled mineral specimens based upon the recognition of their general physical properties.

(2) Manipulative skill. The handling of a precision instrument, such as the mineralogical microscope, requires not only the exercise of great care, but also reveals to a marked extent whether or not a student has or can develop mechanical skill or sense.

(3) General and technical information. It is to be taken for granted that the dentist should be intelligently informed concerning the raw materials which enter into the manufacture of his instruments and materials. This more general information is imparted by describing the important minerals which act as such raw materials. It is obvious that a discussion of the manufacture and structure, especially microscopical, of those dental materials involving the use of minerals or mineral products, such as plaster of Paris, and dental porcelains, cements, powders, and pastes will give the student extremely valuable information of a highly technical character.

Conduct of the Course

The course consists of two lectures and a two hour laboratory period a week for one semester, embracing sixteen weeks of classroom work, exclusive of examinations. After a general introductory lecture the following subjects are discussed: crystal forms, physical and chemical properties of minerals, descriptive mineralogy, elementary treatment of optical methods, and the manufacture and general properties, both macro-and microscopical, of plaster of Paris, and dental porcelains, cements, and pastes. In the laboratory the student is given training in (a) the recognition of crystal forms, (b) the determination of minerals, (c) the use of the mineralogical microscope, and (d) the study and determination of various dental products. Since the laboratory work is very closely supervised, one assistant being available for every six or seven students, rapid progress is assured.

Content of the Course

The ground covered in the various subjects discussed in the lectures and studied in the laboratory will be described briefly.

(1) Crystal forms. Aside from imparting an elementary knowledge of crystallization and crystal forms and preparing the way for the rapid recognition of the common minerals, the chief objects to be attained are, as indicated above, the development of keen observation and accurate visualization. About three lectures and four laboratory periods are devoted to this phase of the work. Only the most common and important forms are considered. A special collection of forty-five wooden models has been assembled for this purpose. The laboratory possesses a sufficient number of these collections so that every student in each section is provided with one.

(2) Physical properties. These are discussed in three lectures and include luster, color, streak, hardness, specific gravity, magnetism, cleavage, fracture, tenacity, diaphaneity, taste, odor, feel, and structure. On account of the importance of hardness in connection with the proper selection of abrasives and in the manufacture of pastes and powders, this subject is discussed at length.

(3) Chemical properties. Three lectures are also devoted to the more essential chemical properties and methods of formation and occurrence of minerals.

(4) Descriptive mineralogy. A list of forty-four minerals of vital importance as sources of dental apparatus and supplies are considered in eight lectures in which practical applications are always emphasized.

(5) Determinative mineralogy. This work is done in five laboratory periods during which the student learns to identify the

minerals discussed in the lectures. This instruction is unexcelled in the development of observation and reasoning ability.

(6) OPTICAL METHODS. In six lectures the construction of the mineralogical microscope and the methods of determining the principal characteristics, such as index of refraction, isotropic or anisotropic character, extinction angles, strength and character of double refraction and so forth, of sections and fragments are presented. These lectures are well illustrated not only with numerous models but also with slides and mineral sections and powders which are projected upon the screen by an epidiascope using a mineralogical microscope. In the laboratory the student works through a series of exercises illustrating the above methods and gains sufficient facility so that they can be applied in the study of dental minerals. Two and one-half laboratory periods are given over to this work.

(7) TECHNICAL APPLICATIONS. The necessary scientific foundation having been laid, it is now possible to discuss the manufacture and properties of some of the more important dental supplies, especially those of a non-metallic character.

(a) PLASTER OF PARIS. One lecture is devoted to the manufacture of this substance which is of such great importance to the dentist. Its nature, methods of dehydrating gypsum, effects of time and temperature on the process of hydration, impurities, effects of accelerators and retarders, and the cause and nature of "setting" are considered. In the laboratory the constituents of dental plaster are studied under the microscope. The student also observes that "setting" is a crystallization process and notes that the strength of plaster of Paris, after setting, is due to the interlocking of the many minute, slender crystals which have been formed.

(b) DENTAL PORCELAIN. Two lectures are devoted to the consideration of the manufacture and various properties of teeth and dental porcelain in general. The optical and thermal properties of the raw materials such as quartz, feldspar, and kaolin, are first discussed, and in considerable detail. The various steps in the manufacture of artificial teeth are then described, due reference being made to the reactions involved. Porcelain inlays are also referred to. Moreover, the difference between dental and ordinary porcelain is pointed out. In the laboratory, first, observations of the optical properties of the raw materials are made. Then thin sections of finished teeth are studied with respect to the structure and constituents of the product and with reference to the changes the raw materials have undergone.

(c) Dental cements. The nature, composition, preparation, and properties of some of the more important cements constantly used by the dentist are discussed, such as zinc oxide and silicate cements. Theories concerning their setting are also advanced. In the laboratory the various reactions taking place in the setting of a zinc oxide cement are followed under the microscope. Observations are also made regarding the optical properties, growth, structure, and arrangement of the resultant crystals. A sample of porcelain cement is also studied.

(d) Dental powders and pastes. Standard preparations now on the market are considered. The properties of the various constituents and methods for their identification under the microscope are presented. The laboratory practice includes the identification of the constituents of several well-known preparations.

(e) Crystalline salts of the saliva. The forms and nature of the products, the result of the evaporation of saliva, as revealed by the microscope, are presented. A list of the important substances thus observed is given. In the laboratory the student is given an opportunity to make these observations.

One lecture is devoted to each of the last three subjects. The laboratory work relating to technical applications is done in about three laboratory periods.

SUMMARY

This course is designed to stimulate and develop observation, visualization, and manipulative ability and skill early in the dental curriculum, especially before the highly technical instruction is begun. This is of great advantage so that those who are markedly deficient along these lines may be advised to prepare themselves for other professions. Upon the completion of the course the instructors furnish the administrative officers of the College of Dental Surgery with estimates of each student's ability along the several lines indicated above, which are taken into consideration in evaluating the students' chances of success in the subsequent strictly professional courses. The results obtained thus far indicate that this special course will unquestionably prove of great value in the training of better equipped dentists with broad interests.

CALICO HILLS, SAN BERNARDINO CO., CALIFORNIA

William F. Foshag,[1] *U. S. National Museum*

The borate deposits of the Calico Hills were discovered in 1882, the chief ore being a hydrous calcium borate, named colemanite after William T. Coleman, at that time prominently interested in the borax industry and an associate of F. M. ("Borax") Smith. Because of the beautifully crystallized character of the mineral, specimens soon found their way into all the important mineral collections of the world.

The borate localities are situated in the eastern portion of the Calico Hills, not far from the famous old silver camp of Calico. They are easily reached from Yermo, a division point on the Los Angeles Branch of the Union Pacific Railroad, which may be conveniently reached from San Bernardino by way of Barstow over a highway paved the greater part of the way. From Yermo the road leads east along the railroad for 3 kilometers and then turns north on the Granite Wells road. The first branch road to the west leads to the few remaining cabins of the old camp of Borate. The distance from Yermo to Borate is 13 km. (8 miles). The mines have long since been idle, but surface workings are abundant and yield good mineral specimens.

The borate beds outcrop on both sides of the gulch in which the camp is situated, the south side being more prolific. The ore occurs as lenses in a soft shale.

About ½ km. east of the cabins on the south side of the gulch one will find an old abandoned inclined shaft. The shale face at the point carries a number of geodes which are lined with large, clear crystals of colemanite. These geodes also carry at times beautiful, light blue or colorless prismatic crystals of celestite, often as large as 4 cm. in length. The colemanite bed continues east along the flank of the hill and crystallized colemanite is found in almost all of the workings. At the extreme southeastern part of the ledge crystallized gypsum is associated with the colemanite.

Near the cabins a number of chalky seams are prominent; these are made up of minute flat tabular crystals of howlite. The seams are at times a meter or more thick and specimens can be obtained in abundance. Howlite also occurs sparingly as thin shiny plates on colemanite crystals.

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[1] Published with the permission of the Secretary of the Smithsonian Institution.

About 300 meters above the cabin an old road leads out of the gulch over a low saddle. This road continues as a trail over to the west workings. The first workings one meets along this trail contain abundant crystallized gypsum in cavities in a light buff calcareous shale. The crystals are well formed, range up to 6 or 8 cm. in size, and make excellent specimens. They are very abundant and specimens can be obtained in quantity. Specimens of crystallized colemanite are also met with here.

Above the cabins the old railroad roadbed follows along the north side of the hill. In the first workings at the contact of the shales with the andesitic tuff, ulexite of an unusual habit is met with. The ulexite lines cracks in the andesitic tuff and radiated tufts of fine needles can be obtained. These groups are quite different from the usual "cotton-ball" type of ulexite found at other localities.

Further along occasional cuts reveal cavernous limestone carrying colorless, prismatic crystals of celestite up to 3 cm. in length.

The mineral "bakerite" has been described from this locality, but diligent search failed to reveal any, and it is possible that this mineral is an impure form of howlite. The howlite is often called pandermite at the mines, but no true pandermite (priceite) has been found in this district.

PROCEEDINGS OF SOCIETIES

NEW YORK MINERALOGICAL CLUB

Regular Monthly Meeting of October 11, 1922

Dr. George F. Kunz presided at the regular monthly meeting, 31 persons being present. In the absence of the Secretary the reading of the minutes of the previous meeting was dispensed with. George E. Ashby was asked to act as secretary protem.

Miss Florence Miller, 606 West 115 St., New York city, was favorably reported on by the Membership Committee and on motion was unanimously elected to membership. The report of the Committee appointed to arrange a program of meetings for the season of 1922–23 was read by the Secretary.

Dr. Kunz spoke of the coming Pasteur Celebration and outlined the program expected. The Corresponding Secretary (W. G. Levison) sent a letter received from Wm. Niven referring to some of his archaeological explorations in Mexico. J. P. Wintringham exhibited some rock specimens from the drift at Oakland, N. J. and described the iron ore deposits near Pompton Junction. P. Walther exhibited specimens of trona he had received from Narobi, East Africa. Mr. Walther stated that the deposit which was of unknown depth, was 2 miles wide and 22 miles long. The trona contains 98% sodium carbonate. Mr. Walther also described a visit he had made to an English fluorite deposit many years ago. He exhibited a specimen of brown spar coating over large fluorite crystals. George L. English described his recent visit to mineral localities in Sicily, Norway and Sweden, and exhibited a large group of very perfect and brilliant dioptase crystals from S. W. Africa. Mr. English also described a large cubical crystal of silver and a rope of wire silver as thick as an arm and 4 ft. long from Kongsberg; also from the same locality large cubo-octahedrons of fluorite, clear and colorless.

Mr. English also related his visit to Vesuvius and his descent into the crater. Mr. Atkins gave an account of a recent trip he had made to the carnotite localities of Colorado, describing the occurrence in the canyon formations. Mr. Atkins also spoke of the Breckenridge Collection of gold specimens in Denver. The meeting then adjourned.

G. E. Ashby, *Sec. protem.*

PHILADELPHIA MINERALOGICAL SOCIETY

Academy of Natural Sciences of Philadelphia, October 12, 1922

The *Thirtieth Anniversary Meeting* of the Philadelphia Mineralogical Society was held on the above date with Mr. Trudell, and later, Mr. Vaux, in the chair.

Those present were Messrs. Boyle, M. Bernstein, Clay, Egee, Eriksson, Flack, Frankenfield, Ford, Gordon, Hoadley, Jones, Keeley, Knabe, Lapp, Millson, Oldach, Skinner, Trudell, Vanartsdalen, Vaux, Warford, Wills, Wilkinson; and eight visitors, including Messrs. George L. English, Paul Wikul, John F. Deegan, Clarence J. Treston, Ralph D. Pearce, and Horace Hallowell.

Upon recommendation of the executive council, the following were elected active members: Messrs. E. P. Wilkins and James Henry Wilkinson.

Mr. Frederick Oldach proposed the following for active membership: Messrs. Paul Wikul, John F. Deegan, Clarence F. Treston, and Ralph D. Pearce.

The secretary was instructed to cast a ballot for the election of the following officers for 1922-23:

President: George Vaux, Jr.
Vice-president: Harry W. Trudell
Treasurer: Harry A. Warford
Secretary: Samuel G. Gordon.

Mr. Harry W. Trudell described "A DECADE OF COLLECTING," in which the principal excursions of members of the Society were graphically narrated. A large number of lantern slides of photographs taken on trips was exhibited.

Mr. George Vaux, Jr. gave a delightful talk on "SOME MINERALOGICAL REMINISCENCES," principally of the pleasant "Saturday Afternoons"[1] held at the house of his uncle, William S. Vaux (Seventeenth and Arch Streets) where many famous mineralogists gathered to view the minerals;—Charles M. Wheatley, Joseph A. Clay, Doctor Beadle, Joseph Leidy, Joseph Willcox, Theodore Rand, William W. Jefferis, H. Carville Lewis, Clarence Bement, Elwood B. Hancock, and Emperor Dom Pedro.

The secretary was presented with a beautiful silver loving cup, after which the Society adjourned for refreshments, and an examination of the minerals exhibited.

Samuel G. Gordon, *Secretary*

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[1] These Saturday afternoons have been happily revived by Mr. George Vaux, Jr., on which occasions members of the Society gather to view his magnificent collection.

BOOK REVIEWS

DETERMINATIVE MINERALOGY. Second edition. Charles H. Warren. 163 pages. McGraw-Hill Book Company, *New York*, 1922.

This "edition" is, more strictly speaking, a second impression of the first edition which appeared in 1921, (*Am. Min.*, 7, 14, 1922) with many of the errors and inconsistencies of the former work rectified. The preface of the new "edition" contains four additional tests not previously referred to:—a flame test for manganese, and reactions for cerium, caesium and cassiterite. In the case of the test for cassiterite the gray, metallic coating on the mineral is not *tin* but *zinc*, as the SnO_2 acts as the cathode and causes the deposition of the Zn which was dissolved by the action of the acid upon the metal which serves as the anode (*Chem. Ztg.*, 44, 797-8, 1920).

The book in the present form with its convenient size and flexible cover is a vast improvement over the earlier edition and no doubt will appeal to some instructors of blowpipe analysis. One still looks in vain, however, for a number of well-established tests which are of service in mineral identification; such as, the Cassius purple test for gold, observations through the Merwin flame color screen, and distinguishing tests for calcite, aragonite and dolomite (Meigen, Lemberg, and Cornu).

W. F. H.

MIKROSKOPISCHE PHYSIOGRAPHIE DER MINERALIEN UND GESTEINE. Rosenbusch-Wülfing, 5th edition, fully revised. Vol. I, First Half, 800, XVI+252 pages, with 192 text figures. E. Schweizerbart'sche Varlagsbuchhandlung, *Stuttgart*, 1921.

The publication of this revision of this widely known reference work, the first edition of which was published in 1873, was delayed on account of the world war. At present only one-half of the volume has been printed. The order of treatment has been changed radically and it is to be seriously questioned as to whether the new arrangement is an improvement over the old one.

Following a short introduction, there is a discussion of the methods of preparation of thin sections. This is called part one. Part two deals with optical methods of investigation and consists of chapters on the fundamental conceptions of crystal optics, including discussions of isotropic and anisotropic crystals without circular polarization, interference phenomena, absorption phenomena, and changes of optic properties through external influence. There are also two chapters on the production of polarized and monochromatic light.

When completed, this book, like the earlier editions will unquestionably prove to be of great value to advanced students of crystal optics and petrography.

E. H. Kraus

NOTES AND NEWS

Dr. Henri Buttgenbach has succeeded G. Cesàro as Professor of Crystallography and Mineralogy at the University of Liége, Belgium.

Professor James R. Withrow of Ohio State University has returned from an extensive trip on the Continent where he visited many famous mineral localities.

Mr. Albert J. Walcott, a graduate of the University of Michigan, and for the past three years engaged in research work in optical glass with the Bausch & Lomb Optical Company, has been appointed lecturer in mineralogy at Northwestern University.

Dr. Oliver Bowles of the United States Bureau of Mines has been admitted as an honorary member of the Institution of Quarry Managers of Great Britain.

Two extensive lists of new mineral names have recently appeared: Neue Mineralien, by Arthur Schwantke, *Fortsch. Min. Krist. Petr.*, **7**, 154-174, 1922, and Ninth list of new mineral names, by L. J. Spencer, *Mineralog. Mag.*, **19** (98), 334-354, 1922. Many of the new species referred to in these lists have been abstracted in THE AMERICAN MINERALOGIST, others will appear in the near future.

Bulletin 724 of the U. S. Geological Survey contains an interesting account of the nitrate deposits in the Amargosa region of southeastern California. The nitrate-bearing material (caliche) resembles in character and mode of occurrence the caliche of Chile, but the quantity of nitrate that could be produced would be very small and the cost high. Though these deposits are the most promising in the United States the development from a commercial standpoint was found to be impracticable.

CORRECTION

I regret that in my article on the plagioclase feldspars I misquoted Dr. Alling; the following corrections will serve to make the references to his work more accurate: Page 115, line 7, after 'Alling[4]' delete the words 'suggested that this is the case.' Line 8, for 'but' read 'and'; delete 'no'; line 10, for 'really' read 'not'; line 11, delete 'on the contrary.' Footnote, for page 193 read 237. Page 116, line 6, delete 'as for instance in the monograph on the feldspars by Alling.' E. T. W.

NEW MINERALS: NEW SPECIES

FAMILY: SILICATES. DIVISION: $R':R'':R''':Si=1:3:1:5$

Torendrikite.

A. LACROIX: A series of potassic alkaline-syenite rocks with sodium minerals from Madagascar. *Compt. rend.*, **171**, 594-600, 1920; this mineral, pp. 595-596; also, Minéralogie de Madagascar, vol. **1**, p. 541, 1922.

NAME: From the locality, *Torendrika* (or Itorendrika) in the valley of the Imorona, Madagascar.

CHEMICAL PROPERTIES: Formula, approximately $Na_2O.4MgO.CaO.FeO.Fe_2O_3.$-$10SiO_2$. Theory Na_2O 5.6,MgO 14.5, CaO 5.0,FeO 6.5,Fe_2O_3 14.4, SiO_2 54.0. Analyses by Raoult of material from two distinct localities gave: SiO_2 52.52, 54.10; TiO_2 0.57, 0.42; Al_2O_3 2.59, 1.00; Fe_2O_3 12.95, 13.02; FeO 5.51, 8.09; MnO 0.73, n.d.; MgO 14.74, 12.81; CaO 3.86, 3.82; Na_2O 4.51, 5.24; K_2O 1.43, 0.94; F 0.09, 0.12; H_2O 0.41, 0.12, X—, 0.31, sums 99.91, 99.99%.

This is regarded as the first member of a distinct group of amphiboles, intermediate between those of richterite, imerinite, and glaucophane.

Physical Properties: Color, brilliant bluish black; under the microscope very pleochroic, γ pale yellow, β violet, α sea blue. Extinction is incomplete in white light, but approaches 40°. Sp. gr., 3.15 to 3.21.

Occurrence: A constituent of eruptive alkaline-syenite rocks occurring in the high plateau of Madagascar. In part found in chalcedonic masses, evidently residual from aplite or pneumatolytic veins. E. T. W.

Unnamed

G. F. Herbert Smith: A curious crystal from Binn Valley, Switzerland. *Min. Mag.*, **19**, 40, 1920.

Physical Properties: Color steel gray, luster metallic, streak black. Sp. gr. 4.2.

Crystallographic Properties: A twinned crystal when measured failed to show angles in agreement with any of the minerals thus far described and apparently represents a new species. It is tabular in habit and probably triclinic; $a:b:c = 3.3425:1:3.5536$; $\alpha = 90°0'$, $\beta = 102°8'$, $\gamma = 90°0'$. Tables record both observed and calculated values.

Occurrence: Found loose in a collection of minerals from the Binnenthal, labeled "scleroclase?" W. F. H.

DOUBTFUL SPECIES

FAMILY: ELEMENTS. DIVISION: NON-METALS

"Daiton-sulfur."

T. Wada: Minerals of Japan, 2nd. ed., 1916; this mineral p. 19; through *Min. Abstr.*, **1**, (3), 63, 1921; original in Japanese, not seen.

Name: From being a form of *sulfur* peculiar to the locality, *Daiton.*

Properties: A monoclinic form of sulfur distinct from β and γ sulfurs, described by M. Suzuki, *J. Geol. Soc. Tokyo*, **22**, 343, 1915.

Discussion: To be classed as a variety of *Sulfur, monoclinic*, now considered a definite mineral species, *J. Wash. Acad. Sci.*, **7**, 451, 1917. E. T. W.

"Rubber-sulfur."

T. Wada: *op. cit.*, p. 21.

Name: From being a form of *sulfur* with the general properties of *rubber.*

Properties: Amorphous and plastic.

Discussion: To be classed as a variety of *Sulfur, amorphous*, now considered a definite mineral species; *op. cit.*, p. 452. E. T. W.

FAMILY: HALIDES. DIVISION: ?

"Pseudomendipite."

E. Rimann: Chubutite and the significance of its discovery. *An. Soc. Quim. Argentina*, **6**, 326, 1918; through *Min. Abstr.* **1**, (5), 121, 1921, and *Min. Mag.*, **19**, (98) 348, 1922; (original not seen).

Name: From *pseudo*, false, and *mendipite.*

Properties: Said to have the formula $3PbO.PbCl_2$, but the analysis quoted does not support this formula.

Discussion: Requires confirmation. E. T. W.

FAMILY: OXIDES. SUBFAMILY: HYDROXIDES. DIVISION: $R'': H_2O=1:1$

"Iron-pyrochroite."

G. Flink: Pyrobelonite, a new lead-manganese vanadate from Långbanshyttan. *Geol. För. Förh.*, **41**, 433-447, 1919; this mineral, p. 436. (Cf. *Am. Min.*, **5**, 87.)

Name: From the composition, an *iron*-bearing *pyrochroite.* (The form here used is a translation of the German form, "Eisen-pyrochroit.")

Properties: Differs from ordinary pyrochroite in showing acicular habit of its crystals, also in mode of alteration.

Discussion: To be classed as a variety, for which the term *ferriferous pyrochroite* would seem to be more appropriate. E. T. W.

FAMILY: SULFATES. DIVISION: $R''':S:H_2O=4:1:X$

"Hydro-glockerite."

Edward Greenly: The geology of Anglesey. *Mem. Geol. Survey Gt. Britain*, 1919, **2**, this mineral p. 832; through *Min. Mag.*, **19**, 342, 1922; (original not seen)

Name: From the composition, an apparently excessively *hydrous glockerite.*

Properties: Ocher-like; containing approximately 8 molecules of water to one of sulfur trioxide, instead of six as usually ascribed to glockerite.

Discussion: The exact water-content of such materials is of little significance, and this is to be classed as an unimportant variety. E. T. W.

FAMILY: SILICATES. DIVISION: $R'':R''':Si=2:3:3$ (with F_2 replacing O?)

"Fluor-meionite."

Earl V. Shannon: Some minerals from the old tungsten mine at Long Hill in Trumbull, Connecticut. *Proc. U. S. Nat. Mus.*, **58**, 469-482, 1920; this mineral p. 482.

Name: From the composition, a *meionite* containing *fluorine.*

Properties: A suggested isomorph in scapolite, the mineral as a whole containing 2.74% fluorine.

Discussion: If really a member of an isomorphous series, it could be classed as a sub-species; but requires confirmation. E. T. W.

FAMILY: SILICATES. DIVISION: $R':R'':R''':Si=2:2:2:3$.

"Calciobiotite."

F. Zambonini: The pipernoid tuffs of the Campania, and their minerals. *Mem. Descr. Carta Geol. Italia*, **7**, pt. 2, 124, 1919; thru *Min. Abstr.* **1**, (4), 107, 1922. (Original not seen.)

Name: From the composition, a *calcium*-rich *biotite.*

Properties: Color pale. CaO content 14.33%.

Occurrence: In blocks of metamorphosed limestone, in tuffs on the Campania, Italy.

Discussion: The term *calciferous biotite* would probably be adequate for this evidently varietal material. E. T. W.